



Factor and Revenue Analysis of Small Scale Palm oil Processing in Ekiti state, Nigeria

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General Note



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ABSTRACT

This study was carried out in Ekiti State Nigeria to evaluate the factor and revenue analysis of small scale palm oil processing in Ekiti state, Nigeria. Information was gathered from a total of 120 women cassava processors through a well-structured questionnaire. A multi-stage random sampling procedure was adopted in the selection of respondents. The analytical tools employed were descriptive statistics, Gross benefit ratio and Cobb Douglas production function model. Findings on profit maximization show that the processors realize a profit of ₦2.27 for each ₦1.00 spent in the cause of processing meanwhile the result of Cobb Douglas regression indicates that cost of bunch reception and cost of transportation were positive and significantly influence the gross return to scale of the respondents in the study area. The study showed that small scale palm oil processing in the study area was decreasing because the summation of the regression coefficient was lower than Unity, suggesting that the production is within subsistence level. The findings recommend adjustment to cost of human labour which is highly significant in production but shows a negative relationship with the Gross return so as to increase the level of income and other inputs such as water and firewood should be used efficiently.

Key words: Revenue, Factor analysis, Gross return, Cobb Douglas function, small scale

1. INTRODUCTION

The oil palm (*Elaeis guineensis*) a perennial crop is one of the essential crops and additionally the most important oil crop in Nigeria and the world at large, it is a native of West Africa, it superfluities in the humid tropics in groves of unstable density, mainly in the coastal belt between 10°N latitude and 10°S latitude (Heartly, 1988). Since independence in 1960, the Nigerians agriculture sector has experienced slow output and unable to keep pace with increasing population, thus resulted in declining in domestic food supplies, agricultural exports, and a growing reliance on imported food. Demand for palm oil is on the increase, with the world exports rise from about five hundred thousand (500,000) tons to over two million (2,400,000) tons per annum and the emergence of Malaysia as the world's largest producer accounting for 56% of world production FAO, (2008). Basiron, (2006) observe that palm oil is now a major source of sustainable and renewable raw materials for the world's food, oleo-chemical and bio-fuel industries, thus, global production has doubled over the past ten(10) years and demand are growing fast with Indonesia and Malaysia leading the world market in palm oil production.

Nigeria has been particularly fortunate in having vast oil reserves recording increased growth in palm oil production between 1961 and 1965 when the nation accounted for 43% of the world oil palm production (Mgbeje, 2004), but in recent times it has been plagued by economic chaos and political instability while this decline can be partly explained by environmental and biological conditions such as drought and serious pest and disease infestation, there are other prominent reasons for its decline, including the neglect of the agricultural sector after the oil (crude oil) bloom and unfavorable government policies among others. However, the report shows that out of 14.4 million tones of world palm oil production, Nigeria only accounted for 7% palm oil produced annually, further indications shows that Nigeria had self-sufficiency ratio of 89% tons indicating that the country has to import about 11% tons of palm oil to meet her domestic demands FAO,(2012). As a result of increasing population and income growth merging with relative low productivity of the oil palm sector, Nigeria has become one of the largest importers of palm oil. Also, the rapid devaluation of naira coupled with high cost of transportation from ports to internal markets put imported oil in a completely disadvantage position, thus Nigeria's first goal is to meet the domestic markets of oil palm industry vis-à-vis increase the overall economic development through its income and employment effects in the rural and urban economics.

According to Olagunju (2008), processing of palm oil is major Occupation and an income source to a large percentage of the resource-poor rural people in Nigeria especially in the southwestern part of the country. However, palm oil production and processing as drastically downsized, evidence from (CBN/NISER:2012) shows that this situation has been brought about by several socio-economic and political factors along with the technological know-how in the industry, principal among the factors responsible for this is the inefficiency that exists in the production system for palm oil processing such inefficiency arises from the high cost of labor, lack of linking roads for transportation, electricity, water, inadequate credit facilities and lots more which leads to the inability to provide quality palm oil and most importantly hindered profit maximizations. These particular areas need improvement and this can be achieved by putting certain factors into considerations to attain a specified level of improvement. Some of those factors include the adoption of improved technologies and improvement in efficiency, access to socio-economic facilities, etc., and these factors must be properly addressed and implemented to attain a cost minimization, maximum production rate, and profit maximization.

According to Olayide and Heady, (1982) and Ezeh, (1998), every producer's goal is to maximize profit, derive maximum satisfaction on produce, and reduce the cost of production or combination of all these. However, they maintained that the objective of profit maximization is commonly assumed for a typical entrepreneur in the farm – firm sector is subject to resource constraints. A profit-maximizing entrepreneur will not use a given resource beyond the point where the resource adds to his proceeds as it adds to its cost because this negates the principles profit maximization. However, for a given farmer to increase profit below such a point, he must be willing to use more resources. In most cases, the allocation of resources is said to be efficient at a point when the value of the marginal product of each resource equals price. Several significant questions remain in the minds of many farmers on how to increase profit especially on palm oil production in the study area. Such include among others are; What is the cost and returns to palm oil processing in the study area, is it increasing or decreasing?, What are the factors productivity in palm oil processing in the study area?, What are the factors influencing productivity in palm oil processing? In a bid to answer these questions, the study aims to determine the cost and returns to palm oil production, evaluate factors productivity in palm oil processing, and identify constraints to palm oil.

2. RESEARCH METHODOLOGY

The Study Area

The study was carried out in Ekiti State Nigeria; the state is bounded by Kwara State on the north, Kogi State by the east, Osun State on the west and Ondo State by the south. Geographically, Ekiti state is located between the longitude 4°2' and 5°4' east and latitude

6°2' and 8°5' north of the equator with the population density of 2,384,212 according to the 2006 population census, it has an estimated land mass of 1,089,868 square kilometers, Ekiti state is basically agrarian state, which enjoys a typical climate with two distinct season, the wet or rainy season observed from April to October and dry/dust season which prevails for the remaining months (NAERLS and NPAFS 2010). The farmers in the state were engaged in many agricultural activities such as livestock production, cultivation of crops such as food crops, cash crops, and tree crops among others to sustain their livelihood (Olowoyeye, Osundare and Ajiboye 2018).

Sampling technique and Data collection

A multi stage sampling techniques was use to select respondents for the study. This involves the random selection of six local government areas representing two local governments from each of the three senatorial districts in the state, followed by the random selection of two towns/communities from each of the selected Local Government Areas. The last stages involve the selection of ten palm oil processors from each of the selected communities through a snowball sampling process. In all a total of one hundred and twenty (120) respondents will be selected for interview. Structured questionnaire were used to elicit information from respondents on their socio-economic characteristics such as age, sex, income level, farming experience etc., processing characteristics such as frequency of processing, transportation, method of production and all elements of cost items involved in the processing chain.

Data Analysis

The research analysis was carried out using descriptive statistics (such as mean, mode, standard deviation, frequency and percentage, minimum and maximum values) to describe and categorize the socio-economic characteristics of the respondent. Gross Benefits Ratio was used to determine the cost and returns to palm oil processing in the study area, the difference between gross revenue and total variable cost of processing gives the gross margin, which was used to access the returns of farmers involved in palm oil processing. Linear regression analysis was also use to analyze the factor influencing palm oil processing in the study area. Cobb Douglas function was chosen in the course of this study based on its fitness to agricultural production (Barman, Islam and Hossain, 2002).

Gross Margin (GM)

The gross margin (GM) is express as follows: -

$$GM = TR - TVC$$

Where GM = Gross Benefits

TR = Total Revenue

TVC = Total Cost

Total Revenue (TR) = Average quantity of palm oil processed (Liters) x Average unit price (₦)

Total Variable Cost (TVC) = summation of all the variable cost incurred during production

Input Factor Analysis (Cobb Douglas regression analysis)

The model is specified in logarithmic form as;

$$\ln Y = \ln \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \dots + \beta_n \ln X_n$$

The specified implicit form was:

$$Y = F(X_1, X_2, X_3, X_4, X_5, e)$$

Where;

Y = Gross benefit, measured in ₦

X₁ = Cost of bunch reception, measured in ₦

X₂ = Cost of firewood, measured in ₦

X₃ = Cost of transport, measured in ₦

X₄ = Cost of labour, measured in ₦

X₅ = Cost of water measured in ₦

β = constant

e = Error terms.

3. RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents

The respondents characteristics that are of interest to this study are Age, marital status, educational background, household size, Source of labour, and processing experience etc.

Gender and Age distribution of the respondents

The sex and age distribution of respondents (Table 1) shows that majority of farmers processing palm oil were women. This can be attributed to the fact that women play active role in processing of farm output while men are more involved in production and farm maintenance. Meanwhile, the respondents' average age of 47 years is still within the active work force bracket, this study tends to agree with Ekong (2003) which confirmed that Nigerian farmers are within the age bracket of 40-60 years.

Marital status and Household size Distribution of the Respondents.

79.2% of the respondents were married with a relatively large household size of 6 – 10. Larger percentage of married processor may be as a result of the needed assistance and support of male gender during processing. The findings are in line with Osundare and Olowoyeye 2018 that large household sizes could be advantageous to processors if the household members are willing to provide family labor.

Educational Distribution of the Respondents

Education is very important factor in every aspect of human endeavor; the case of farmers processing palm oil is not an exemption as being illustrated in Table 1, it reveals that majority of the respondents (65%) study area are literate i.e they had at least primary education, an indication that the rate of adoption of cassava processing innovations may be high Ibitoye, Akinsorotan, Meludu and Ibitoye (2011). The result of this research work was in conflict with the findings of Shitu (2012) that low level of literacy is frequent in the rural areas.

Distribution of the Respondents by Processing Experience and litters of Oil produced

Table 1 shows that the average palm oil processing experience of respondents in the study area is 13years and 8months with a standard deviation of 9.83 suggesting that most of the farmers are highly experienced i.e. have been involve in palm oil processing more than 9 years an indication that processors in the study area are likely to make decisions that would increase their productivity all things been equal. Olowoyeye *et al* (2018). Meanwhile, average litter of palm oil processed in the study area was 86.95L per Month with a STD(standard deviation) of 56.98 while the minimum and maximum palm oil processed is 10Litters and 400Litters respectively suggesting that the processors are producing on a small scale.

Distribution of the Respondents by Major source of labour and Method of Processing

The research (Table 1) shows that farmers processing palm oil in the study area depends largely on hired labourer when engaged in processing this could have a serious effect on their profitability if they are not well utilized. Meanwhile, it was also revealed in the findings that farmers in the study area understand the usefulness of modern tools in production with larger proportion of the respondents (99%) make use of modern processing tools.

Table 1: Socio-economic Distribution of Women Cassava Processors in Ekiti State

Variables	Frequency	Percentage	Mean	Standard deviation	Mini mum	Maxi mum
Sex						
Male	78	65				
Female	42	35				
Total	120	100				
Age			46.57	13.412	15	75
≤30	19	15.8				
31 – 40	22	18.3				
41 – 50	37	30.8				
51 – 60	27	22.5				
≥60	15	12.5				
Total	120	100				

Marital status						
Single	11	9.2				
Married	95	79.2				
Widow	14	11.7				
Total	120	100				
Educational level						
No formal education	30	25				
Primary	34	28.3				
Secondary	44	36.7				
Tertiary	12	10				
Total	120	100				
Household size			6.1083	2.1016	1	15
≤53	34	28.3				
6 – 10	85	70.8				
11–15	1	0.8				
Total	120	100				
Processing experience			13.87	9.83	1	50
≤10	55	45.8				
11 – 20	46	38.3				
21 – 30	11	9.2				
31 – 40	5	4.2				
≥41	3	2.5				
Total	180	100				
Qty of palm oil produced			86.958	56.980	10	400
≤100Litters	84	70				
101 – 200Litters	34	28.3				
≥300Litters	2	1.7				
Total	120	100				
Source of labour						
Hired labour	116	96.7				
Family labour	4	3.3				
Total	120	100				
Method of processing						
Traditional	4	0.83				
Modern	116	99.17				
Total	120	100				

Source: Field Survey, 2019.

Cost and Return Analysis of palm oil processing per production cycle

Cost constitutes the expense incurred during production, the result of cost and benefit analysis associated with palm oil production in the study area is presented in Table 2. The processors recorded an average output of 86.95 liters per production cycle. The gross total revenue was ₦47,828. The total variable cost of ₦21,046. However, in spite of the level of processing cost of palm oil in the study area, the processors record a gross margin of ₦26,782. An implication that the processor realized a profit of ₦2.27 for each ₦1.00 spent in the cause of processing (a return per naira of 227%), indicating that farmers producing palm oil in the study area was running a profitable business.

Table 2: Gross margin analysis of Palm oil Processing

ITEMS		VALUE
A.	Gross Revenue	
1.	Average output/L	173.9
2.	Unit price(₦)	550
3.	Gross Total Revenue(₦/ L) (1*2)	47,828
B.	Variable Input Cost (₦)	
i.	Fruit bunch	9362
ii.	Water	1747
iii.	Transportation	2825

iv.	Firewood	2550
v.	Labour Cost	
a.	Clarification	515
b.	Sterilization	628
c.	Pressing	735
d.	Threshing	2684
vi.	Total Variable Cost	21,046
C.	Gross Margin (₦/L) (3 – vi)	26,782
D.	Return per Naira	227%

Source: Data analysis 2019

Exchange Rate: ₦365 = \$1

Factor Productivity in Palm oil Processing

The result of the Cobb Douglas production function used in evaluating the input factor productivity in palm oil processing in the study area is presented in Table 3. From the table, the coefficient of cost of firewood was non - significant but negative, this suggest excessive use of this inputs in the processing palm oil which may be as a result of its abundance in the study area. The coefficient of cost of water was neither significant nor negative (0.14). That is, an increase in its usage will increase the gross benefit by 0.14 percent; this implies that the respondents were rational in allocating these resources which is perhaps one of the major inputs in palm oil processing. The coefficient of cost of bunch and cost of transportation was positive (0.39 and 0.619) and significant at 5% and 1% respectively, i.e. there would be increase in gross margin by 0.386% and 0.619% if this inputs were increased. It could be said that the processors were lucid in allocating this resources; in the meantime, there is need for its increase to derive more results. The coefficient of the cost of labour was negative but significant at 10%, this suggest under utilization of labour in palm oil processing in the study area. Much return would be realized if the farmers could readjust their labour use. The sum of regression coefficient was 0.875; this was lower than unity suggesting decreasing return to scale in palm oil processing in the study area. This could be attributed to inefficient use of some inputs such as labour and water. With the R^2 of 0.54 which implies the explanatory variables used in the model specification were very important and at such 54% of variation in the processing of palm oil was explained by them. However, the larger the R^2 value, the more important the regression equation is in characterizing the endogenous variable (Gomez and Gomez, 1984; Barman et al, 2002).

Table 3: Summary of Regression Results

	Coefficients	t – value
(Constant)	2.691	2.643
Cost of firewood	-0.042	-0.241
Cost of water	0.142	1.624
Cost of bunch reception	0.386	2.458**
Cost of labour	-0.230	-1.710*
Cost of transportation	0.619	3.738***
R2	0.535	

Data Analysis, 2019

*** Significant at 1%, ** Significant at 5%, *Significant at 10%

Table 4: Distribution of Respondents by major challenged face

Problems	frequency	percentage
Lack of capital	84	35
Lack of social amenities	60	25
Lack of modern equipments	54	22.5
Technical competence	42	17.5
Total	240*	100

Source: Field Survey, 2019.

*Total > Sample Size: Multiple answers recorded

Constraints to Palm oil processing

Constraints to palm oil processing in the study area are as shown in Table 4. From the table, lack of capital ranked first among the constraints. This is in line with the findings of Adeoye Olajide, Adelani, Usman and Badmus (2011) that inadequacies in capital on a

consistent basis has been a major challenge facing small scale farming in Nigeria. Other constraint includes lack of social amenities, lack of modern equipments and lack of technical competence respectively.

4. CONCLUSION AND RECOMMENDATION

This study has shown that processing of palm oil in the study area is profitable. It was also revealed that cost of bunch reception and cost of transportation have positive productivity coefficients indicating that any increase in the use of these variable inputs will increase the gross revenue of the farmers. However, the productivity coefficient of cost of labour was significantly negative indicating underutilization of labour input and therefore there is the need for the farmers to adjust the rate of use of this input for greater returns in palm oil processing in the study area. The overall factor coefficient is 0.875 implying a decrease return to scale in palm oil processing in the study area. Therefore there is need for the farmers to efficiently allocate the resources with negative factor productivity to increase their gross margin. Similarly, there is urgent need to address the major challenges faced by the processors in the study area by various parastaters such as government, Financial institutions, NGO's etc. by providing necessary and quality infrastructure, give out credit facilities with little or low interest, improve the knowledge of the farmers with competent extension agents, subsidized and provide modern processing equipments so as to improve their gross margin and take palm oil processing beyond subsistence level.

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